

Imprinted nanopatterned mesoporous TiO₂ layer to optimize the efficiency of perovskite solar cell

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Antireflection on solar cells has attracted great attention and TiO₂ is considered as the best electron transport material for the perovskite solar cells. Herein, we have imprinted four different nanopattern perfluoropolyether (PFPE) mold from polyethylene terephthalate (PET) resin and PET film and used it to desing nanopatterned mesoporous TiO₂ layer with different aspect ratios to improve the energy conversion efficiency of perovskite solar cell. The energy conversion efficiency (η), current density (J_{sc}), open-circuit voltage (V_{oc}), and fill factor (ff) were studied by the reflectance of nanopatterned mesoporous TiO₂ thin film. The reflectance was minimized with the optimized nanopatterned mesoporous TiO₂ and the best efficiency of 15.83% was achieved. The nanopatterned layer on mesoporous TiO₂ changes the refractive index that affects the reflectance and hence the J_{sc} , V_{oc} , and ff which changes the efficiency.